

# **FAA National Software Conference, May 2002**

## **Military Software Certification Issues**

### **Military Software Certification Issues**

**Software DER Conference  
14 - 17 May 2002**

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- **Civil certification process for military aircraft**
- **Issues with civil certification for military programs**
  - Overall issues
  - Specific issues
- **Key recommendations**

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### Civil Certification Process for Military Aircraft

- **Civil certification makes few allowances for military aircraft or components**
  - **Today**, it only addresses originally FAA certified baselines, i.e., **military derivatives**
  - **Today**, there's no FAA certification criteria for military-developed aircraft
    - bombers, fighters, unmanned vehicles
- **Achievement of foreign certification approval requires FAA certification, due to bilateral agreements (airborne CNS)**
  - Current FAA aircraft certification process is required for any program seeking civil approval

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### Certification Process

#### - Exceptions for Military Derivatives-

- **FAA form 8130-2, Conformity Certificate, Military Aircraft**
  - This identifies military equipment found to be nonconforming to FAA requirements for a specific aircraft
- **"In Work" Military Standard Order**
  - Like a TSO, for GPS with military functionality
  - GPS systems with MSOs will be considered to be equivalent to a TSO

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### Issues for *Military Derivative* Programs

- **General differences & issues**
  - Contract implications
  - Language confusion
- **Specific differences & issues**
  - Roles & responsibilities in civil certification
  - Role of the system safety assessment process
  - Avionics development
  - Verification & validation differences
  - Flight test, certification & post-production

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### Military Derivatives Contract Problem

- **Military:**
  - the contract is owned by them;
  - is the source of the requirements & therefore approval
- **FAA:**
  - independent of any contract
  - is source of civil requirements & approval
- **Conflict catches the contractors in the middle**
  - **Good planning up front can reduce or eliminate this**

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### Language Confusion

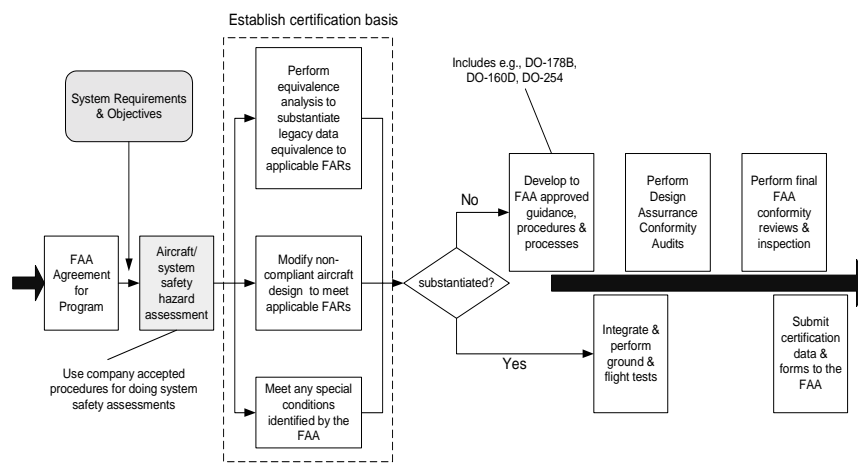
- **Same words different meanings or application, i.e.,**
  - Conformity
  - Approval
  - Legacy
- **Different words or concepts**
  - “incremental certification credit”

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### Role of the System Safety Assessment Process



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### Avionics Development Issues

- **Many are unaware of known impacts to program scope**
  - Criticality levels of A, B or C
  - New development
    - New digital system development requires significant certification/program effort
  - New guidance
    - certification guidance has been fast evolving in the last 5 years
      - must meet it
  - Need for rigorous partitioning, proof of non-interference
- **Technical / process compliance criteria: established by the DER(s)**
- **TSO's cannot be mistaken for "COTS"**

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### Verification & Validation Issues

- **Formal Qualification Testing (FQT) is acceptable *only* if it allows "incremental certification credit"**
- **Be aware that "incremental certification credit" is not understood**
  - New concept to assure no violation of the conformity of the type design data (requirements/ design/ code or hardware development/test)
    - Requires version control, baselines, and problem reporting; *data must be retained*
- **Design assurance inspection audits *assuring continuance of conformity* from the software developer to the integrator are not understood**
  - FAA Software Notice 8110.86

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### Final Acceptance, Certification & Post-production Differences

- **Military programs do not have a formal acceptance / certification phase / Type Inspection Authorization**
  - The time flow needed is not necessarily recognized or considered
    - for completing analyses, test reports, flight test performance analyses, Software Accomplishment Summaries
  - The military equivalent in establishing readiness for First Flight is less established and formal
    - role of software maturity & closure of safety related software problem reports

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### Key Findings/Recommendations

- **DERs need to participate in military proposal development**
  - Military needs to demand DER involvement in proposals
- **Provide identification of FAA requirements to contractor, suppliers, customers**
  - Make sure your company has current FAA certification training available particularly for management & other participants, including the military customer
    - Should be required for company & suppliers
  - Assure program schedules reflect required certification tasks & time flows

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### Key Findings/Recommendations

- **All must understand the FAA requirements up front in order to have budget & schedule that supports certification**
  - Military acquisition needs to be in alignment with achieving FAA certification
- **ACO engineers may need to have highly visible support to the DER(s) during the conduct of the program**
  - *Preventative measure for “undue pressure on a DER”*
  - *Consider more insight on TSO developments for military applications*

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### Key Findings/Recommendations

- **Gain awareness of the military culture differences, including language and intent of military unique processes & events**
  - Could either be redundant or equivalent to a civil practice/requirement
- **Assure clear system & software partitioning in classified systems**
  - Includes wiring, separate units, & physically partitioned functions
- **To assure safe systems, FAA or military service may need to consider sponsoring security clearances for DERs**

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### Acronyms

- ACO Aircraft Certification Office
- ARP Aviation Recommended Practice
- CNS/ATM Communication-Navigation-Surveillance/Air Traffic Management
- DOD Department of Defense
- GATM Global Air Traffic Management
- FQT Formal Qualification Test
- GPS Global Positioning System
- ICAO International Civil Aviation Organization
- MSO Military Standard Order
- SSA System Safety Assessment
- TIA Type Inspection Authorization
- TSO Technical Standard Order
- TSOA Technical Standard Order Authorization

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### **FAA - ESC/GAT Informal Technical Interchange**

- Discussions on common technical software issues related to CNS/ATM systems
- Caveats
  - Not official FAA policy
  - Not official USAF policy
  - We are merely sharing information of mutual interest

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### Discussion topics

- Topics include
  - Dead code removal
  - Upgrading baselines to 178B “equivalence”
  - DO-200A/DO-201A guidance
  - Classified systems
  - Service History

### Status

- In the process of preparing three papers
  - Dead code removal
  - Upgrading a previous baseline to DO-178B equivalence
  - Additional guidance on 200A/201A
- Targeting presentation to CAST in June 2002